Digital Elevation Model of Pensacola Florida: Procedures, Data Sources, and Analysis

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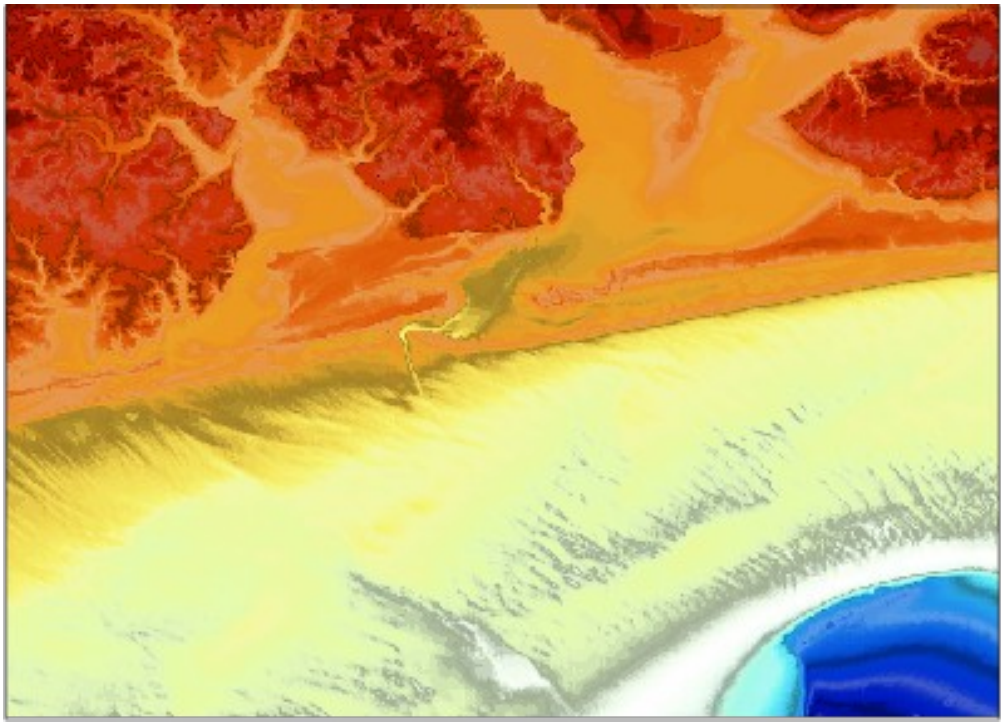
Summary

In September of 2015, NOAA's National Geophysical Data Center (NGDC) developed a topographic-bathymetric digital elevation model (DEM) of Pensacola, Florida (Figure 1) for NOAA's Pacific Marine Environmental Laboratory (PMEL). The 1/3 arc-second DEM will be used to support improving the coastal tsunami inundation forecasts. This DEM covers the coastal area of Pensacola, Florida, including surrounding areas of Florida and Alabama. The extents of this DEM, procedures, data sources, and analysis are described below.

Figure 1. Pensacola, Florida Mean High Water (MHW) DEM



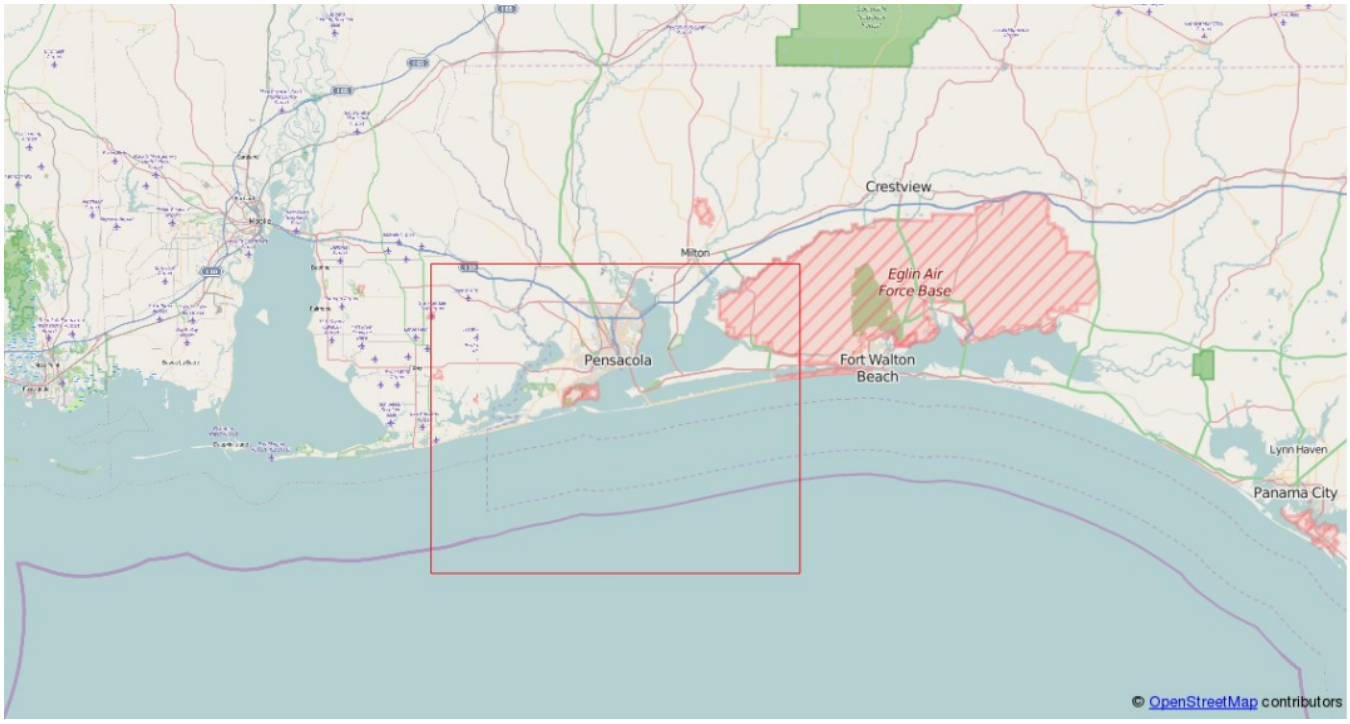
DEM Specifications

The Pensacola DEM was built to the specifications listed in Table 1. Figure 2 shows the 1/3 arc-second boundary in red.

Table 1. Specifications for the Pensacola, Florida DEM.

Grid Area	Pensacola, Florida
Coverage Area	-87.65° to -86.8° W, 30° to 30.61° N
Coordinate System	Geographic decimal degrees
Horizontal Datum	World Geodetic System 1984 (WGS 84)
Vertical Datum	Mean High Water (MHW)
Vertical Units	Meters
Cell Size	1/3 arc-seconds
Grid Format	ASCII raster grid

Figure 2. Map image of the DEM boundary for the Pensacola, Florida DEM in red.



Data Sources and Processing

The digital coastline used in developing the Pensacola DEM was generated by editing the Global Self-consistent, Hierarchical, High-resolution Geography Database (GSHHG) shoreline based on the Google satellite imagery layer. The digital coastline was converted into a polygon for use in masking topography and eliminating interpolated data.

Bathymetry data used in the compilation of the Pensacola DEM included sounding data from NOAA agencies, bathymetric lidar data and completed datasets from NGDC (Table 2).

Topographic data used in the compilation of the Pensacola DEM included lidar data from various sources including USACE and USGS as well as completed datasets from NGDC and USGS.

The bathymetric and topographic data were transformed from their original datums to a horizontal datum of WGS 84 and a vertical datum of NAVD 88 prior to DEM development. After DEM development, the DEM was transformed to a vertical datum of Mean High Water (MHW) using a vertical transformation grid generated with NOAA's Vdatum tool.

Table 2: Bathymetric and Topographic Data Sources used in compiling the Pensacola DEM.

Source/Title	*Date*	*Data Type*	*Spatial Resolution*	*Horizontal Datum*	*Vertical Datum*
Florida Panhandle Lidar	2006	Topographic & Bathymetric Lidar	< 1 meter	WGS 84 Geographic	NAVD 88
USACE Alabama & Florida Lidar	2010	Topographic Lidar	< 1 meter	WGS 84 Geographic	NAVD 88
USGS Mobile Bay Lidar	2010	Topographic Lidar	< 1 meter	WGS84 Geographic	NAVD 88
USGS Baldwin County Lidar	2011	Topographic Lidar	< 1 meter	WGS84 Geographic	NAVD 88
USGS National Elevation Dataset	2013	Digital Elevation Model	1/3 Arc-Second	WGS84 Geographic	NAVD 88
NOAA NGDC Mobile, AL DEM	2011	Digital Elevation Model	1/3/ Arc-Second	WGS84 Geographic	NAVD 88
NOAA Multibeam	N/A	Multibeam Hydrographic	Varied	WGS84 Geographic	Mean Sea Level (MSL)
NOAA NOS	1887 - 2013	Hydrographic Survey Soundings	1 meter to several kilometers	NAD 1983 Geographic	Mean Lower Low Water (MLLW)

DEM Development

After the data were transformed to common horizontal datums, the data were visually reviewed for consistency and errors. Where more recent, higher resolution data existed, older data were superseded. In some areas, older multibeam data were retained as newer overlapping data contained errors during data acquisition. The edited and evaluated data were then converted to ASCII xyz format using GDAL then gridded at 1/3 arc-second using GMT's' surface' tool to generate a bathymetric surface which provided full data coverage of the DEM area. The surface was then clipped using the digital coastline to create the final bathymetric DEM. The final bathymetric DEM was then converted to ASCII xyz for use as input in generating the final DEM.

DEM Analysis

Recommendations to improve the Pensacola, Florida 1/3 arc-second DEM are listed below:

- Conduct topographic/bathymetric lidar surveys of coastal areas along bays and harbors.
- Conduct high resolution surveys of Ono Island area in Alabama and Florida.

References

Amante, C.J., M.R. Love, L.A. Taylor, and B.W. Eakins, 2011. Digital Elevation Models of Mobile, Alabama: Procedures, Data Sources and Analysis, NOAA Technical Memorandum NESDIS NGDC-44, Dept. of Commerce, Boulder, CO, 43 pp.

Wessel, P., and W. H. F. Smith, A Global Self-consistent, Hierarchical, High-resolution Shoreline Database, J. Geophys. Res., 101, #B4, pp. 8741-8743, 1996.